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DEPARTMENT OF THE INTERIOR
BUREAU OF EDUCATION

BULLETIN, 1917, NO. 22

THE MONEY VALUE OF EDUCATION

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CONTENTS.

	Page.
Letter of transmittal	3
National wealth and power determined by education	5
Education and individual success	14
Salaries of college graduates	41
List of references on the money value of education	46
I. Value to the individual	46
II. Value to the community	51

LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
BUREAU OF EDUCATION,
Washington, February 15, 1917.

SIR: All admit the value of the education of the schools for general culture and esthetic appreciation and as a preparation for citizenship in a democracy, and most are willing to contribute out of the public funds to the support of the schools for these ends when they feel that the people are able to do so without too much sacrifice of what they call the necessities of life and too heavy a drain on their material prosperity. Comparatively few are aware of the close relation between education and the production of wealth, and probably fewer still understand fully the extent to which the wealth and the wealth-producing power of any people depend on the quantity and quality of education. The people themselves and their representatives in tax-levying bodies need to be shown that no other form of investment yields so large dividends in material wealth as do investments in popular education, and that comparative poverty is not to be pleaded as a reason for withholding the means of education, but rather as a reason for supplying them in larger proportion. To assist in this I recommend that the manuscript herewith transmitted be published as a bulletin of the Bureau of Education. The manuscript has been prepared at my request by Dr. A. Caswell Ellis, professor of the philosophy of education in the University of Texas. It is my purpose to transmit later, also for publication as a bulletin of this bureau, a manuscript by Dr. Ellis showing more specifically the direct and indirect relation of higher education to the production of wealth and to industrial development.

Respectfully submitted.

P. P. CLAXTON,
Commissioner.

The SECRETARY OF THE INTERIOR.

THE MONEY VALUE OF EDUCATION.

The most valuable result of right education is the broadening, deepening, and refining of human life. This result can no more be measured by dollars and cents than truth, self-sacrifice, and love can be made out of pork and potatoes. While the higher things of the soul are priceless rewards which true education brings, they are not its only result. The material and measurable rewards of education should be made plain to those whose votes must determine the support of our educational system. Those who desire better support of that system should point out in terms that the people can understand the definite ways in which education promotes industrial efficiency and increases material wealth. That is the purpose of this bulletin.

NATIONAL WEALTH AND POWER DETERMINED BY EDUCATION.

Germany.—The concrete evidence of the effect of education in increasing industrial efficiency is overwhelming, whether considered from the national standpoint or from that of the individual citizen. For example, how else account for the fact that a nation like Germany, with limited natural resources, but with excellent public schools, has grown in wealth and power so much more rapidly than her neighbor, Russia, which has a vigorous and talented national stock and vastly better resources but poor educational facilities? That the phenomenal success of Germany is the direct result of her thorough educational system is generally admitted.

John A. Lapp says:[1]

> Germany, as a result of industrial training, already puts four times as much labor value into its manufactured articles as the United States. If this country merely equaled Germany's present record, we (the United States) would be manufacturing from the same raw products not $20,000,000,000, but $80,000,000,000 worth of finished articles.

President Vanderlip, of the National City Bank of New York, said:

> In the group of great industrial nations there has come forward in recent years one that has taken a place in the very front rank among industrial competitors. That nation is Germany. Her people have lacked the peculiar

[1] "Case and Comment," Sept., 1913, p. 234.

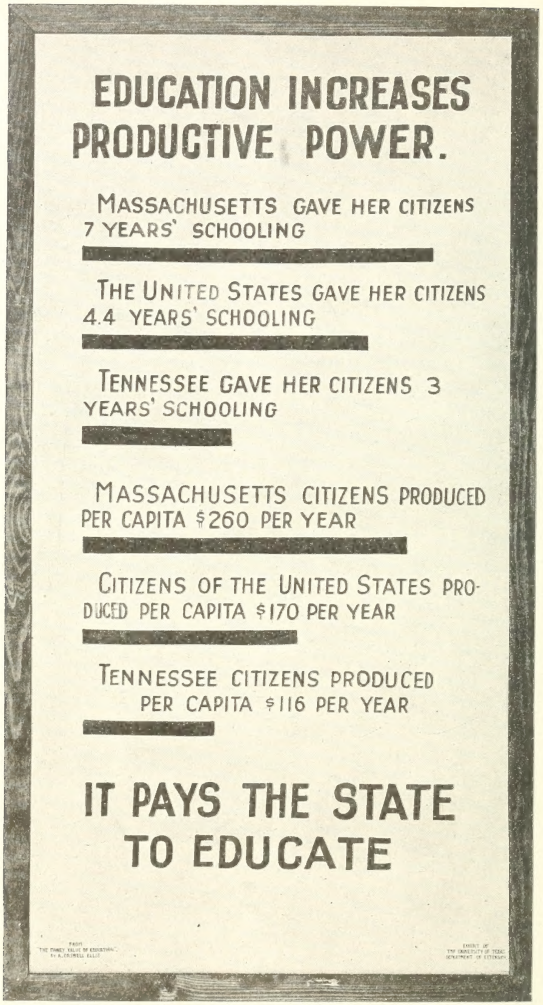
EDUCATION INCREASES PRODUCTIVE POWER.
MASSACHUSETTS GAVE HER CITIZENS 7 YEARS' SCHOOLING
THE UNITED STATES GAVE HER CITIZENS 4.4 YEARS' SCHOOLING
TENNESSEE GAVE HER CITIZENS 3 YEARS' SCHOOLING
MASSACHUSETTS CITIZENS PRODUCED PER CAPITA $260 PER YEAR
CITIZENS OF THE UNITED STATES PRODUCED PER CAPITA $170 PER YEAR
TENNESSEE CITIZENS PRODUCED PER CAPITA $116 PER YEAR
IT PAYS THE STATE TO EDUCATE

FIG. 1.

The figures in this chart are from "A World-Wide Law," by Charles W. Dabney, and are for 1899. The figures would be much higher for all in 1909, but the relative standing of each would be the same. The production for 1909, as estimated from the figures given by the 1910 census, would be: Massachusetts $466, the United States as a whole $332, Tennessee $174.

inventive ingenuity which in many fields of industry has been the sole basis of our achievements. Her artisans have almost none of the delicate sense which makes the French handiwork superior to the obstructions of all tariff walls. But amidst this poverty of natural resources, and from among a people not signally gifted with inventive ability or artistic temperament, there has in a generation emerged an industrial nation which stands forth as a marvel of economic development.

I have had a somewhat unusual opportunity to study the underlying causes of the economic success of Germany, and I am firmly convinced that the explanation of that progress can be encompassed in a single word, the "schoolmaster." He is the great cornerstone of Germany's remarkable industrial success. From the economic point of view the school system of Germany stands unparalleled.

Japan and Russia.—Similarly the relation of her school system to the remarkable development of Japan and her proved ability in the highly technical and complicated art of modern warfare is universally admitted. The defeated Kuropatkin states that the costly failures of Russia were due to the ignorance of her brave but untutored army and to the education of the Japanese. Writing of the causes of defeat, he said:

The noncommissioned officers in the Japanese army were much superior to ours, on account of the better education and greater intellectual development of the Japanese common people. The defects of our soldiers—both regulars and reservists—were the defects of the population as a whole. The peasants were imperfectly developed intellectually, and they made soldiers who had the same failing. The intellectual backwardness of our soldiers was a great disadvantage to us, because war now requires far more intelligence and initiative, on the part of the soldier, than ever before. Our men fought heroically in compact masses, or in fairly close formation, but if deprived of their officers they were more likely to fall back than to advance. In the mass we had immense strength, but few of our soldiers were capable of fighting intelligently as individuals. In this respect the Japanese were much superior to us. * * * Among many of the common soldiers whom we took as prisoners we found diaries which showed not only good education but knowledge of what was happening and intelligent comprehension of the military problems to be solved.

The United States and other countries.—The remarkable results in these instances can not be attributed to racial or climatic differences, for in like manner, in Denmark, in Scotland, in Switzerland, in Massachusetts, wherever there is adequate provision for education, there follow great industrial efficiency and national wealth.

On the other hand, in Spain, in Russia, in Turkey, in Mexico, wherever there is a lack of the necessary school system, there is the same story of poverty, revolution, and misery, regardless of race, climate, or abundance of natural resources. Even in the United States it has been shown that the earning capacities of the citizens of several States are in direct proportion to the efficiency of their school systems. Dr. Charles W. Dabney, who investigated this matter, found, for example, that the average schooling given in 1898–99 to

the citizens of Massachusetts was 7 years; to those of the United States as a whole, 4.4 years, while that of Tennessee was only 3 years. Corresponding to these figures, he found that the average daily production of the citizen of Massachusetts was 85 cents; that of the United States as a whole was 55 cents; while that of Tennessee was only 38 cents.[1]

Mr. Dabney does not tell how he determined the productive capacity of the citizens of these States, but by taking the sum of the combined products of farms, factories, mines, and quarries, as given for each State in the 1910 report of the Census Bureau, and dividing by the population of the State, a very rough approximation of the average earning power of the inhabitants may be secured. When this is done, it shows a productive capacity for 1910 for Massachusetts of $466 per year; for the United States as a whole, of $332; and for Tennessee, of $174.

Massachusetts spent in 1898–99 on her schools $12,261,525 more than Tennessee, which spent only $1,628,313, or $4.62 per pupil, against $38.55 per pupil spent in Massachusetts. But Massachusetts showed a productive capacity of $144 more per year per inhabitant than did Tennessee, and $90 a year more than the average for the United States. In total, Massachusetts put about thirteen millions per year more than Tennessee into her schools and received nearly four hundred million dollars annually in increased earning capacity, in large measure produced by the education of its citizens. Similar studies made by the late United States Commissioner of Education, William T. Harris, and Mr. Wadlin, former chief of the Massachusetts Bureau of Labor Statistics, showed practically the same results.

It would, of course, be very unfair to attribute all this difference in productive capacity to differences in the educational systems of the several States. The large capital on hand, the great trading centers and the numerous factories already established in Massachusetts give that State an advantage. Furthermore, the effect of climate, and many other factors, must be considered before the exact share played by education could be determined. In this and in all other comparative studies of peoples, it must be recognized that absolutely accurate estimates of the part played by education in economic development are not possible. Yet the unbiased observer must recognize that education is a controlling factor when he sees that among all varieties of races, and accompanied by all kinds of conditions of climate, natural resources, geographical location, economic and social environment, in every case educated people produce much and amass wealth, while uneducated people under the same conditions produce little and save less.

[1] World's Work, I, 587–88, Apr., 1901; and "A World Wide Law," the University of Tennessee Index, Ser. II, No. 10.

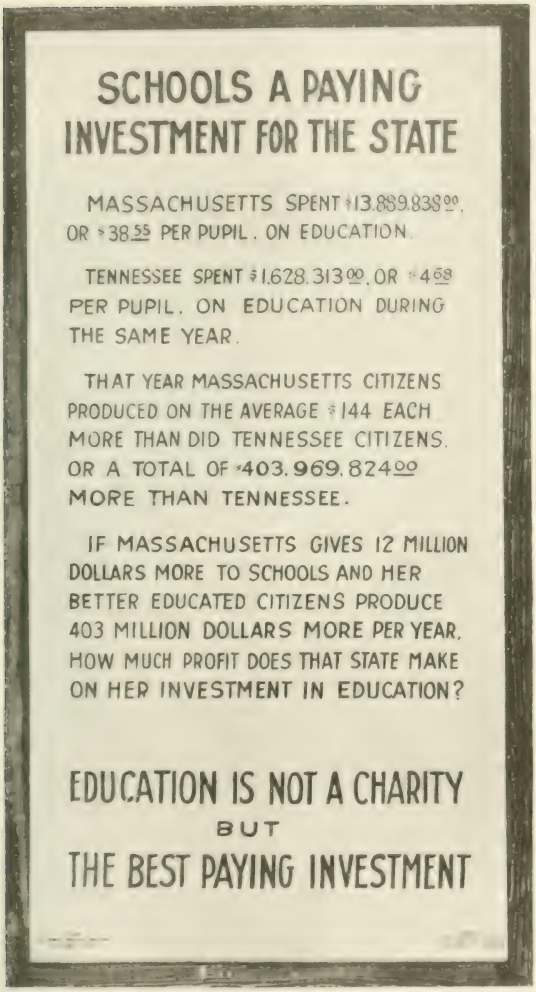
SCHOOLS A PAYING INVESTMENT FOR THE STATE
MASSACHUSETTS SPENT $13.889.838.00, OR $38.55 PER PUPIL. ON EDUCATION.
TENNESSEE SPENT $1.628.313.00, OR $4.68 PER PUPIL. ON EDUCATION DURING THE SAME YEAR.
THAT YEAR MASSACHUSETTS CITIZENS PRODUCED ON THE AVERAGE $144 EACH MORE THAN DID TENNESSEE CITIZENS. OR A TOTAL OF $403.969.824.00 MORE THAN TENNESSEE.
IF MASSACHUSETTS GIVES 12 MILLION DOLLARS MORE TO SCHOOLS AND HER BETTER EDUCATED CITIZENS PRODUCE 403 MILLION DOLLARS MORE PER YEAR, HOW MUCH PROFIT DOES THAT STATE MAKE ON HER INVESTMENT IN EDUCATION?
EDUCATION IS NOT A CHARITY
BUT
THE BEST PAYING INVESTMENT

FIG. 2

The figures are from "A World Wide Law," by Charles W. Dabney, and are for 1899. The figures for 1909 show the same facts. Estimates based on the total productions recorded in the 1910 census reports show a per capita production for Massachusetts of $466, for Tennessee of $174, and for the United States as a whole $332.

Other concrete illustrations of this fact are at hand. For example, Mullhall[1] gives the annual earning capacity of the inhabitants of several European countries as follows:

Nations with efficient educational systems.		Nations with inadequate educational systems.	
England	£36	Spain	£16
France	31	Greece	13
Germany	25	Russia	10

The effect of education upon the accumulation of wealth is equally notable. The figures given by Mullhall for the total wealth per inhabitant of these several European nations are:

Nations with efficient educational systems.		Nations with inadequate educational systems.	
England	£302	Spain	£135
France	252	Greece	101
Germany	156	Russia	61

Similarly, in America, Massachusetts, with slightly smaller population than Texas, has $4,956,000,000 of accumulated wealth to $2,836,000,000 possessed by Texas.[2] That this is not altogether due to the fact that Massachusetts is a much older State than Texas is shown by the fact that Wisconsin, a comparatively new State, with only about two-thirds the population of Texas, has an equal amount of wealth; and California, a newer State, with only two-thirds the population, has $4,115,000,000 of wealth. All three of these richer States for years spent two or three times as much per child on education as Texas spent.

The relation of productive power to education is shown by the enormously increased rate of production that has come about everywhere since education became more generally diffused. The total wealth accumulated in America from 1492 to 1860, a period of 368 years, was $514 per capita. From then till 1904, a period of only 44 years, this increased to $1,318 per capita, or an addition in 44 years of $802 per capita.[3] Since that time the increase has been even more striking. This increase is partly due to increased valuations or the smaller purchasing power of the dollar; to the use of accumulated capital, and to many other things; but after due allowance is made for all these the conclusion is inevitable that the education of the Nation is largely responsible for vastly increasing the productive power of its citizens. The productive power of illiterate countries is not increasing at such rates.

[1] Industries and Wealth of Nations, pp. 391 and 393, published in 1896.

[2] All figures are from the Special Report of the Census Office on Wealth, Debt and Taxation, 1907, p. 37.

[3] Figures from the Special Report of the Census Bureau on Wealth, Debt, and Taxation, 1907, p. 9.

Why educated nations produce more.—That there must be this intimate relation between education and earning power is obvious as soon as consideration is given to the demands of the processes of modern industry. The Asiatic farmer, with his stick plow, makes 6 cents a day,[1] and the illiterate Russian peasant with his primitive implements and methods earns 14 cents, while the American farmer earns many times these sums because his improved methods and implements, made possible by education, have increased his efficiency. The illiterate race is necessarily restricted to the bullock and the stick plow, while the educated nation mines and smelts ores, manufactures the reaper and the traction engine, fertilizes the soil, rotates crops, breeds better stock and better seeds by scientific methods, rises superior to flood, drought, and disease, and multiplies efficiency a hundredfold.

Natural resources worthless without education.—Even a bounteous harvest in a fertile section would avail little for an illiterate people who could not build the engines or boats to transport it, or understand the processes necessary for its preservation against a future day of want. Without the knowledge of chemistry and metallurgy, rich mineral deposits are but so much worthless rock. Without tools and machinery and educated skill to turn them into houses, furniture, and implements for man, vast timber resources are but so many trees cumbering the soil; without educated brain and skilled hands the fertile soil, timbered land, water power, and mineral deposit must forever lie idle or be ignorantly squandered.

Comparison of illiterate and educated workers.—Horace Mann vividly pictures the power of education in his statement about the savage and transportation. Modifying his statement, it can be said: The savage can fasten only a dozen pounds on his back and swim the river. When he is educated enough to make an axe, fell a tree, and build a raft, he can carry many times a dozen pounds. As soon as he learns to rip logs into boards and build a boat, he multiplies his power a hundredfold; and when to this he adds mathematics, chemistry, physics, and other modern sciences he can produce the monster steel leviathans that defy wind, storm, and distance, and bear to the uttermost parts of the earth burdens a millionfold greater than the uneducated savage could carry across the narrow river.

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[1] Report on taxation. Proceedings and Addresses Nat. Educ. Assoc., 1907, pp. 27–28.

"In India only 5 per *cent* can read and write, and those the men receive for farm work, in the Madras district, 6 to 8 cents a day; women, 4 to 6 cents; children, 2 to 3, the laborers boarding themselves" (pp. 9 and 10).

"If Asia had a Panama Canal to dig, she would dig it with picks, hoes, and shovels, and tote out the earth in baskets. Nothing but human brain and muscle would be employed, and the men would be paid little, because without tools and knowledge they must always earn little. But America puts brains, science, steam, electricity, machinery into her Big Ditch—tools and knowledge, in other words, and the days' work wages because a man thus equipped does the work of 10 men whose only force is the force of muscle."—"Asia's Greatest Lesson for the South," Clarence H. Poe, pp. 10–11.

The efficiency of an illiterate people in competition with an educated nation is as the crooked stick against the sulky plow; the sickle against the reaper; the bullock cart against the express train, the ocean greyhound, and the aeroplane; the pony messenger against the telegraph, telephone, and wireless; the individual harangue against the printing press, the newspaper, the library; the spinning wheel against the factory; the pine fagot against the electric light; the peddling of skins and herbs from the oxcart against the bank, the check book, the railroad, the department store; the log hut against the steel skyscraper; the unaided eye against the microscope and telescope; incantations and magic against the chemist, the hospital, the modern physician and surgeon. Take away from one entire generation all education, and society must revert to the stick plow, the oxcart, and such primitive means, because steel implements, locomotives, steamships, electricity, telephones, telegraph, waterworks, steel buildings, mining and chemical industries, factories, modern sanitation, hygiene and medicine, books, newspapers, courts of justice, and laws that protect property and defend the rights of the weak are all impossible without education and are efficient only in proportion as educated intelligence is applied to them.[1]

The necessity for education rapidly increasing.—The necessity for education has increased and will continue to increase with the advance in the complexity of the processes of civilization. Because of the unparalleled progress in the arts and sciences during the past fifty years the need for education has in a generation multiplied many fold. For example, a century ago a transportation system was little more than a wagon and a driver who knew the road. Now, in handling a problem of transportation, experts in traffic must first determine whether a road in that place will be worth while, and what kind of road will be most economical and efficient; experts in finance must provide the tremendous sums needed to build the road; civil engineers must lay it out; bridge engineers plan the bridges; chemical engineers test the materials; mills and factories with scores of chemical and physical experts make the rails, build the locomotives and steel cars; and a host of traffic experts, auditors, accountants,

[1] "The advantage to each of the education of all is admirably brought out in the following paragraph from Mr. Clarence Poe: 'You prosper just in proportion to the prosperity of the average man with whom you are brought into business contact. If the masses of the people are poor and ignorant, every individual, every interest, every industry in the community will feel and register the pulling-down power of their backwardness as inevitably as the thermometer records the temperature of the air. The merchant will have poorer trade, the doctor and lawyer smaller fees, the railroad diminished traffic, the banks smaller deposits, the preacher and teacher smaller salaries, and so on. Every man who through ignorance, lack of training, or by reason of any other hindering cause, is producing or earning only half as much as he ought, by his inefficiency is making everybody else in the community poorer.'"—"Asia's Greatest Lesson for the South," Clarence H. Poe, pp. 3–4.

and specially trained managers and clerks, telegraphers, engineers, conductors, and others keep the trains moving with safety and with profit. In like manner the farmer can no longer merely exhaust one fertile piece of fresh soil after another by crude methods of agriculture. Intelligent rotation must be planned, soil must be conserved and built up, improved stock and seed must be bred; methods of cultivation that stimulate growth and conserve moisture and fertility must be practiced; markets must be studied and considered in planting; new methods of marketing must be used, accounts must be kept, and homes must be made healthful. If this is not done the landowner will soon lose his land and become a tenant and the tenant become a day laborer. In law, in medicine, in teaching, in manufacturing, in trade and industry of all kinds, this same increased demand for education is found.

A banker's opinion.—Speaking in 1905 at Girard College, Mr. Vanderlip said:

> The mental equipment of a business man needs to be greater to-day than was ever before necessary. Just as the sphere of the business man's actions has broadened with the advent of rapid transportation, telegraphs, cables, and telephones, so have the needs of broad understanding of sound principles increased. It was steam processes of transportation and production that really made technical education necessary. The electric dynamo created the demand for educated electrical engineers. So the railroad, the fast steamship, the electric current in the telephone and cable, and the great economic fact of gigantic and far-reaching business combinations are making the science of business a different thing from any conception of commerce which could have been had when Girard was the most successful of business men. The enlarged scope of business is demanding better trained men, who understand principles. New forces have made large scale production, and we need men who can comprehend the relation of that production in the world of markets. There has been introduced such complexity into modern business and such a high degree of specialization that the young man who begins without the foundation of an exceptional training is in danger of remaining a mere clerk or bookkeeper. Commercial and industrial affairs are conducted on so large a scale that the neophyte has little chance to learn broadly, either by observation or experience. He is put at a single task; the more expert he becomes at it the more likely it is that he will be kept at it, unless he has had a training in his youth which has fitted him to comprehend in some measure the relation of his task to those which others are doing.

Business growing more complicated.—An excellent illustration of the manner in which modern business has widened the scope of its demands for training and broad education is given by J. T. Young in speaking of several modern industries:[1]

> The production of oil has led to an especially interesting series of auxiliary enterprises. Crude and refined oil, petroleum jelly, gas, gasolines, and light oils, fine and heavy lubrication oils, wax, paraffin, chewing gum, oil cake,

[1] Annals Amer. Acad. Pol. and Soc. Sci. 28, pp. 28–37, "Business and Science" by J. T. Young.

barrels, tin cans, bags, and wooden boxes are all manufactured in the various departments and plants of the industry. In addition, it has proved profitable to own and operate banks, steamship lines, and various other commercial undertakings.

In gas manufacture, tar, briquettes, light oils, dyes, creosote, and coke are resultant by-products leading to the development of new markets and new departments of business. The most successful meat-packing concerns have been directed by men who are able to develop extensive "allied" industries. Besides the usual dressed fresh, canned, dried, and smoked meats, the packing interests manufacture soups, meat extracts, sausage, lard, toilet, laundry, and wool soap, gelatin, pepsin, glue, fertilizer, etc., and operate printing establishments, can, box, and paint factories, extensive refrigerator car lines, and meat, fruit, and vegetable refrigerating plants. In addition to the manufacturing side of the business, a wholesale organization has been built up which distributes some of the products throughout practically the entire domestic market.

The manager of a modern business enterprise of any size must be able to trace the exact cost of production of each article, study the markets of the world in order to make wise contracts for sale and purchase, must know how to advertise economically and create or increase his market, must be able to organize and reorganize the departments of his plant, borrow money advantageously, secure favorable transportation rates, stop wastes, work up by-products, and do many other things that were unknown a few years ago. Without the wide use of former waste products, few large enterprises could now maintain themselves. Indeed, so carefully have these been studied that the by-products are at times the chief source of profit, in some cases modern science turning what was formerly a source of trouble and expense into one of great revenue, as was the case in the turning of the injurious sulphur fumes given off in smelting into sulphuric acid. The Tennessee Copper Co., of Copper Hill, Tenn., several years ago was sued for heavy damages by owners of neighboring land because the sulphurous fumes given off by the plant did great injury to the trees and other vegetation around. The expert chemist was called in, and he, by his superior education, was able not merely to stop the injury to the vegetation but to convert these sulphurous fumes into sulphuric acid, one of the profitable by-products of the smelter.

EDUCATION AND INDIVIDUAL SUCCESS.

Who's who in America.—That national wealth and industry are dependent primarily on education and must in the nature of things become more and more dependent thereupon as civilization advances is now so obvious that further illustration is unnecessary. That individual education is an equally vital factor in individual efficiency and success in the varied walks of practical life is a matter about which the facts are not so obvious, as the occasional large successes of com-

paratively unschooled men and the not infrequent failures of men of much schooling have attracted disproportionate attention and obscured the more significant facts. But in recent years several studies have been made which show the influence of education upon individual success.

An investigation of the educational advantages enjoyed by the eight thousand persons mentioned in "Who's Who in America," for the years 1899–1909, brought out the following facts:[1] Out of the nearly five million uneducated men and women in America, only 31 have been sufficiently successful in any kind of work to obtain a place among the 8,000 leaders catalogued in this book. Out of thirty-three million people with as much as a common-school education, 808 were able to win a place in the list, while out of only two million with high-school training, 1,245 have manifested this marked efficiency, and out of one million with college or university training, 5,768 have merited this distinction. That is to say, only one child in one hundred and fifty thousand has been able in America, without education, to become a notable factor in the progress of his State, while the children with common-school education have, in proportion to numbers, accomplished this 4 times as often, those with high-school education 87 times as often, and those with college training 800 times as often. If this list had been selected by the universities or school teachers, or if literary leaders only were chosen, it might easily be claimed that the apparently greater success of the educated was due to the line of work from which the leaders were selected. But the selection of the men and women in this book was not in the hands of professors, but in the hands of a firm of business men. They selected leaders in all lines of industry, commerce, agriculture, and other fields of practical endeavor besides the professions, and still this enormously increased efficiency and productivity of those with education was found.

In interpreting the results of this study, as in the interpretation of all of the following comparative studies of those who have education with those who do not have it, let it be understood that the remarkable superiority of the educated must not be attributed entirely to their education. Those who receive education are a selected lot to begin with. Their parents were, as a rule, persons of more than average efficiency, and hence were able to keep their children in school; they were more intelligent than the average, and therefore induced or required their children to remain in school. The child himself probably had more than average ability, else he would have wearied of the intellectual labor of the school and would have left it

[1] "Who Are the Eight Thousand?" a study by W. W. Smith, superintendent of the Randolph-Macon system. Similar statistics given in "Who's Who in America," p. xii, for 1910–11, and covering 15,794 notable Americans, show results "nearly identical" with those for 1899–1909.

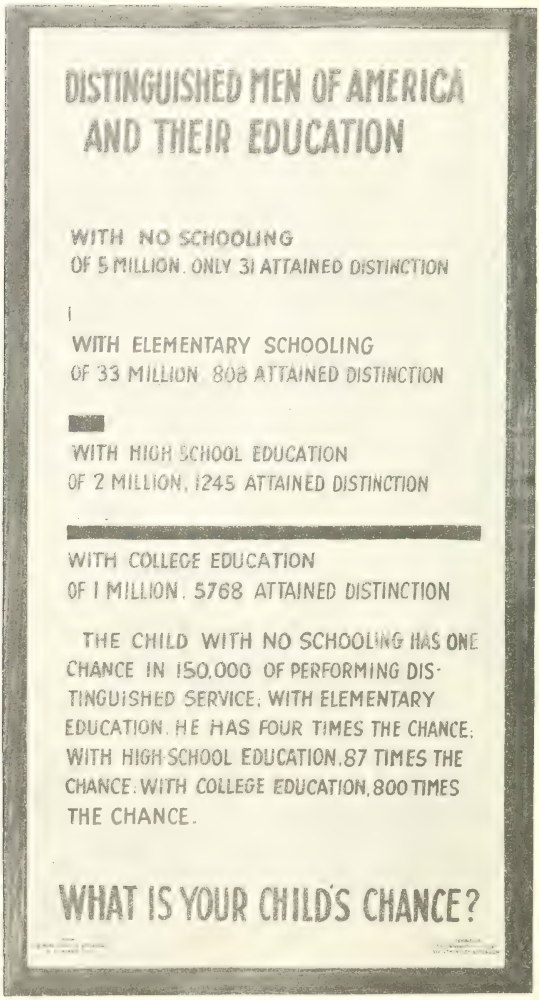
DISTINGUISHED MEN OF AMERICA
AND THEIR EDUCATION
WITH NO SCHOOLING
OF 5 MILLION, ONLY 31 ATTAINED DISTINCTION
WITH ELEMENTARY SCHOOLING
OF 33 MILLION, 808 ATTAINED DISTINCTION
WITH HIGH SCHOOL EDUCATION
OF 2 MILLION, 1245 ATTAINED DISTINCTION
WITH COLLEGE EDUCATION
OF 1 MILLION, 5768 ATTAINED DISTINCTION
THE CHILD WITH NO SCHOOLING HAS ONE CHANCE IN 150,000 OF PERFORMING DISTINGUISHED SERVICE; WITH ELEMENTARY EDUCATION, HE HAS FOUR TIMES THE CHANCE; WITH HIGH SCHOOL EDUCATION, 87 TIMES THE CHANCE; WITH COLLEGE EDUCATION, 800 TIMES THE CHANCE.
WHAT IS YOUR CHILD'S CHANCE?

FIG. 3.

The figures are taken from a study of the distinguished men catalogued in *Who's Who in America* entitled "Who Are the Eight Thousand," by W. W. Smith.

early. Then, too, the child of educated and well-to-do parents has more opportunity offered him to enter lucrative positions. Other influences also doubtless modify the result; but after due allowance for all these factors is made there remains still a large margin of superior efficiency on the part of the educated that one must credit to education or do violence to common sense in interpretation of the undisputed facts.

The college-bred man in business and in politics. Dr. Charles Thwing made a similar study of the 15,142 eminent men mentioned in Appleton's Encyclopedia of American Biography to find the facts especially with regard to the relation between college training and success in political life and in amassing wealth.[1]

Of the 100 wealthiest men in the United States he found that in proportion to the total number in America possessing a college education there were 277 times as many college-bred men who had amassed great wealth as there were of noncollege-bred men. In proportion to their numbers in the population, the college men have become Members of the National House of Representatives 352 times as often as the noncollege-bred men; Members of the Senate 530 times as often; President 1,392 times as often; Justices of the Supreme Court 2,027 times as often. Of the more than 10,000 prominent and successful men in all lines mentioned who were still living, 58 per cent were college graduates and 75 per cent had had some college training. On the whole, the college-bred man had attained enough eminence to be mentioned in such a cyclopedia 870 times as often in proportion to his number as the noncollege-bred man.

In 1898 Prof. J. C. Jones, of the University of Missouri, made a special study of the college graduate's success in the field of national politics. This study is doubly pertinent to this subject, for not only do Congressmen, Cabinet officers, Supreme Court judges, and Presidents receive larger salaries than do average citizens, but, since they make, interpret, and enforce the laws which govern customs, banking, transportation, corporations, policing, and international relations, they exert a powerful and wide-spread influence upon national industry and wealth. Prof. Jones made his study[2] also through an examination of Appleton's Cyclopedia of American Biography, but considered only those who had remained in college long enough to graduate instead of including, as President Thwing had done, all who attended college. Prof. Jones found that over five thousand of the fifteen thousand men mentioned in Appleton's were college graduates. He also investigated the schooling of the Fifty-fourth and Fifty-fifth Congresses and found that 36 per cent of the Representatives and over 36 per cent of the Senators were college graduates.

[1] Amer. Ed. Rev., November, 1908.

[2] Does College Education pay? by J. C. Jones. Forum, 26, No. 354-366, Nov., 1898.

Among those who have been elected to the position of Speaker of the House, 47 per cent have been graduates. Furthermore, the proportion is increasing. From 1789 to 1841 the percentage of Speakers who were graduates was 35, whereas from 1841 to 1898 it was 55. Of the Presidents, 55 per cent had likewise been graduates, this percentage also having increased during the preceding 75 years from 50 to 57. Fifty four per cent of the Vice Presidents, 62 per cent of the Secretaries of State, 50 per cent of the Secretaries of the Treasury, 67 per cent of the Attorneys General, 69 per cent of the Justices of the Supreme Court (87 per cent during the preceding 50 years) were college graduates. As only about 1 per cent of the population ever graduate from college, it is plain that the graduates attain these remunerative and important positions from 36 to 87 times as often as the nongraduates, and that this ratio is still increasing.

The education of the men who framed the Constitution.—As no other one political event has had more to do with national peace and stability, and hence with industrial possibilities, than the framing and adoption of the Constitution, especial significance is attached to the results of Prof. Jones's study of the part which the 1 per cent of college graduates in the country played in this important matter. He found that the author of the Constitution, Thomas Jefferson, was a college graduate; its ablest defender, John Adams, was a college graduate; 23 of the 54 who composed the convention were college graduates, and 27 were college-bred men; 2 of the 3 who brought about the convention—Madison and Hamilton—were college graduates, while the third—Monroe—was a college man; the authors of three of the four plans presented—Madison, Hamilton, and Patterson—were college graduates; the plan finally adopted was that of a college graduate; and after its final adoption the three men who led in explaining it, defending it, and securing its adoption by the States were all college graduates—Madison, Jay, and Hamilton. In fact, the 1 per cent of college graduates in America can almost be said to have called the convention, written the Constitution, and secured its adoption and ratification.

Education and the development of a Western State.—Following quite a different method, Mr. H. E. Kratz made an investigation of the part being played by college-bred men in the recent development of one of the Western States. Mr. Kratz asked men in 15 leading South Dakota cities to name the five leading men in their cities in seven different lines, viz, law, medicine, teaching, the ministry, banking, journalism, merchandising, and manufacturing. Of the 533 men whose names were sent in as leaders in these cities in the several lines, 293, or 50 per cent, proved to have had as much as two years of college training.[1]

[1] "Does College Education Pay?" by H. E. Kratz, in Educ. Rev.; 27, 298–99; Mar., 1899.

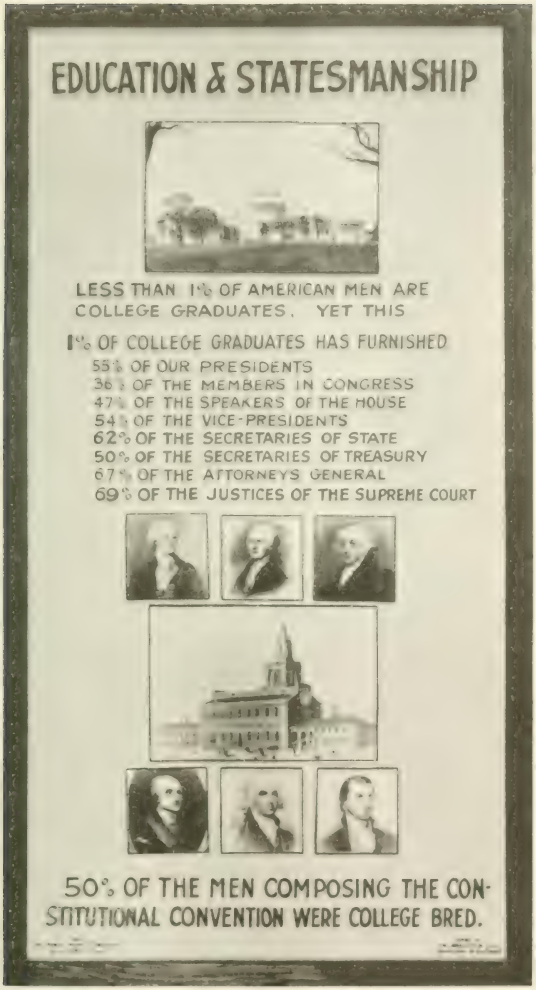
EDUCATION & STATESMANSHIP
LESS THAN 1% OF AMERICAN MEN ARE COLLEGE GRADUATES. YET THIS
1% OF COLLEGE GRADUATES HAS FURNISHED
55% OF OUR PRESIDENTS
36% OF THE MEMBERS IN CONGRESS
47% OF THE SPEAKERS OF THE HOUSE
54% OF THE VICE-PRESIDENTS
62% OF THE SECRETARIES OF STATE
50% OF THE SECRETARIES OF TREASURY
67% OF THE ATTORNEYS GENERAL
69% OF THE JUSTICES OF THE SUPREME COURT
50% OF THE MEN COMPOSING THE CONSTITUTIONAL CONVENTION WERE COLLEGE BRED.

FIG. 4.

The figures are from "Does College Education Pay?" by J. C. Jones in the *Forum*, 26, pages 354-363. The Presidents include all to 1914. The congressional figures are for the Fifty-fourth and Fifty-fifth Congresses. Later Congresses would probably show a larger proportion of college men, as they are more prominent now than in former years in public life. The other figures are to date of the article.

FINANCIAL RETURN OF EDUCATION TO THE INDIVIDUAL.

Individual salary and value to society.—The financial returns which different grades of education make to the individual have been studied recently by two different methods. In some of the studies the investigators went into the factories and other enterprises and found out the amount of schooling that the successful employees in the several grades of work had had. In others they followed out into life the graduates of certain schools and colleges to see what kinds of positions they proved competent to fill and what salaries they received from year to year. The salary paid to an individual because of certain educational qualifications possessed by him represents not only the financial value of that education to him, but also in a general way represents the financial value which the community places upon the service made possible by that education. Some of the results are as follows:

Dodge's study.—One of the earliest of these studies was made by Mr. James M. Dodge, one of the prominent manufacturers of America and former president of the American Society of Mechanical Engineers.[1] Mr. Dodge calculated the financial value of different grades of education by comparing the earning capacities of common laborers, shop-apprentice trained men, trade-school graduates, and technical-school graduates who were employed in the several large factories under his observation. He capitalized at 5 per cent the average annual earnings of 50 weeks of work of a member of each of these classes, and took this sum as the potential value of each when making his comparisons. He concludes:

> A chart thus obtained shows that the laborer starts with $3 a week when he is 16, and rises to $10.20 by the time he is 21, but he rises no higher. His potential value at that wage is $10,200. The apprentice or shop-trained worker starts with the same wages as the laborer at 16, but rises more rapidly, and is earning by the time he is 24 years old $15.80. His potential value at that time is $15,800, but he makes no further rise. The trade-school graduate, starting at the same point, rises still more rapidly, and is earning when he is 25 years of age $22 per week, his potential value at this point being $22,000. From this point his wages rise less rapidly, reaching possibly $25 per week at the age of 32, and representing a potential value of $25,000. The graduate of the technical school starts at the same point of a weekly salary of $3, and is earning $4 when he enters college at 18. Upon graduating from college at the age of 22 he can draw a salary of $13 per week. He has then already passed the laborer, but is still a little below the shop-trained apprentice. He passes the latter, however, during his first year of employment, but is still below the trade-school graduate, whom he does not overtake until his twenty-fifth year. From this point on he rapidly leaves behind the other three workers, and at the age of 32 is drawing $43 a week, his potential value being $43,000. Thus, four years' training at a technical school makes a man, by the time he is 32, four

[1] "The Money Value of Technical Training," J. M. Dodge, in the Transactions of Amer. Soc. of Mechan. Engineers, vol. 25.

FIG. 5.

The figures are from "The Money Value of Technical Training," by J. M. Dodge, in the Transactions of the American Society of Mechanical Engineers, volume 25, pages 40–48.

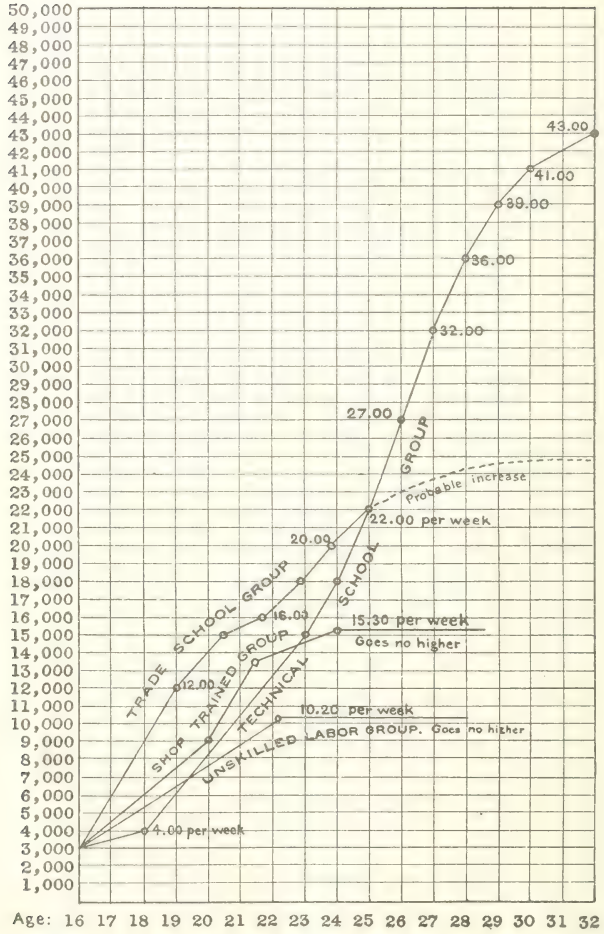

FIG. 6.

Charting the value of education to the factory worker. (See also Fig. 5.)

times as valuable as the laborer, approximately three times as valuable as the shop-trained apprentice, and 72 per cent more valuable than the trade-school graduate—surely a good return for four years spent in preparation.[1]

Mr. Dodge found that even in the lowest grades of factory work the uneducated laborer was often unsuccessful. Only 35 per cent of the unskilled remained in the factory even in unskilled work, 5 per cent went somewhat higher, while 10 per cent had to be dismissed and 20 per cent left of their own accord for one cause or another.

It has been objected to this study that the factories under Mr. Dodge's supervision were not typical ones, but that in them a value was placed upon education above that allowed in other factories. That this is not true is shown by the fact that the salaries reported for the trade-school graduates in the Dodge factories are actually lower than those received in various other factories by the graduates of three widely separated trade schools reported by O'Leary.[2]

The educated fail less often.—Another study of the actual performance of educated men in the business world was made by H. J. Hapgood. Mr. Hapgood's results were similar to those of Dodge and brought out especially the large per cent of successes among college-bred men in responsible, high-salaried positions, and the comparatively small per cent of successes on the part of the non-college-bred men. He says:

> A notable instance of the value of college men is furnished by the Western Electric Co., which began employing college men about 10 years ago, and has found that 90 per cent of them make good, as compared with 10 per cent of the men who enter business on leaving the high or grammar school.[3]
>
> Statistics based on data gathered from the experience of 100 business houses and covering a period of three or four years show that about 90 per cent of the college men were successful in rising to large salaries and responsible positions, as compared with 25 per cent of the noncollege men.
>
> There is no doubt that college graduates are the chief and best source of supply for the reserve force which every progressive firm should be accumulating.[4]

Factory workers' salaries and education in Massachusetts.—The Massachusetts committee on industrial education made a study of 709 workers who had left school at either 14 or 18 years of age and traced the actual average salaries received by these workers from

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[1] In a private letter to Prof. Person, of Dartmouth College, Mr. Dodge gives this additional information:

"The data of my address on the money value of training were obtained by investigating the records of the Link Belt Engineering Co. and the Dodge Coal Storage Co., the records covering a period of about 14 years. I then had the figures compiled with such records as I could obtain from my friends in somewhat similar lines of business, and, for fear of being in error, made a reduction of about 10 per cent from what the actual statistics show."—Quoted by W. A. O'Leary in his report on "The Wage Value of Vocational Training," Appendix VI of the Fourth Report of the New York State Factory Investigating Commission, p. 1429.

[2] O'Leary, W. A. The Wage Value of Vocational Training, p. 1425.

[3] Annals Amer. Acad. Pol. and Soc. Sci., July-December, 1909, pp. 65–67.

[4] Ibid., p. 64.

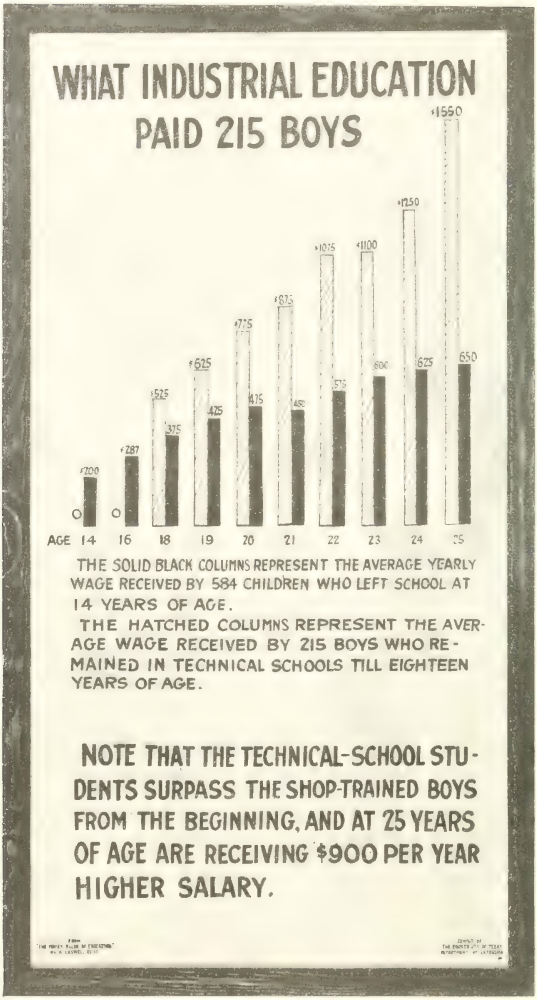
WHAT INDUSTRIAL EDUCATION PAID 215 BOYS
$1650
$1250
$1100
$1075
$875
$775
$625
$525
$287
$200
650
625
600
575
475
425
375
AGE 14 16 18 19 20 21 22 23 24 25
THE SOLID BLACK COLUMNS REPRESENT THE AVERAGE YEARLY WAGE RECEIVED BY 584 CHILDREN WHO LEFT SCHOOL AT 14 YEARS OF AGE.
THE HATCHED COLUMNS REPRESENT THE AVERAGE WAGE RECEIVED BY 215 BOYS WHO REMAINED IN TECHNICAL SCHOOLS TILL EIGHTEEN YEARS OF AGE.
NOTE THAT THE TECHNICAL-SCHOOL STUDENTS SURPASS THE SHOP-TRAINED BOYS FROM THE BEGINNING, AND AT 25 YEARS OF AGE ARE RECEIVING $900 PER YEAR HIGHER SALARY.

FIG. 7.

The figures were taken from the *Report of the Commission on Industrial and Technical Education*, submitted to the Massachusetts Legislature in 1906.

year to year. They found that boys who had remained four years longer in school in order to take a technical course soon caught up in salary with their brothers who stopped at 14, and went ahead of them so rapidly that by the time they were 22 years old the sum of the four years' salary of the better-educated boys was equal to that of the eight years' salary of those who had quit school at 14. At the age of 25 the boys who had taken four years' extra schooling were on the average getting $900 per year more than those who left school at 14.

From the twenty-fifth year on, the boys who had quit school at 14 would secure practically no promotion, whereas those who had remained in school till 18, and had therefore entered the higher-grade industries and positions, would continue to receive promotion and increase in salary for many years.[1]

If, however, it is assumed that each boy continues for the remainder of his normal working life to receive the same salary that he was paid at 25 years of age, the boy who quit school at 14 would receive a total life income of $26,667, while the boy that remained till 18 would receive $58,900. It thus appears that four years of technical education, from 14 to 18 years of age, more than doubles the earning capacity of the average Massachusetts boy engaged in industry and richly repays both him and the State for the time and money devoted to his education.

It is true that the number of children studied by the commission was small, as was the number of industries inspected. Furthermore, the absolute accuracy of the statements of those studied concerning their wages could not always be proved. It would, therefore, be a mistake to suppose that the above figures are to be taken as exact measures of the value of education in industry even in Massachusetts. On the other hand, this committee was composed of some of the ablest educators and most thoughtful men and women in Massachusetts. It employed trained assistants, visited 354 firms, in 55 different industries, in 43 cities, and personally visited 5,459 employees, out of 9,057, between the ages of 14 and 24 years employed by the firms under observation.

Wages of the trained and untrained.—An illuminating comparison was made by Florence Marshall of the wages received by girls in those occupations demanding no training and those that do demand it. The results are graphically shown in Fig. 8.

An investigation by Miss Anna Hedges of the relation between the education and the wages of a number of women in several factories around New York City showed that education through the fourth

[1] The commission found (p. 24) that, out of 1,077 employees studied, 900 of whom were in low-grade industries, only 2 per cent of those who had left school at 14 ever got into high-grade industries.

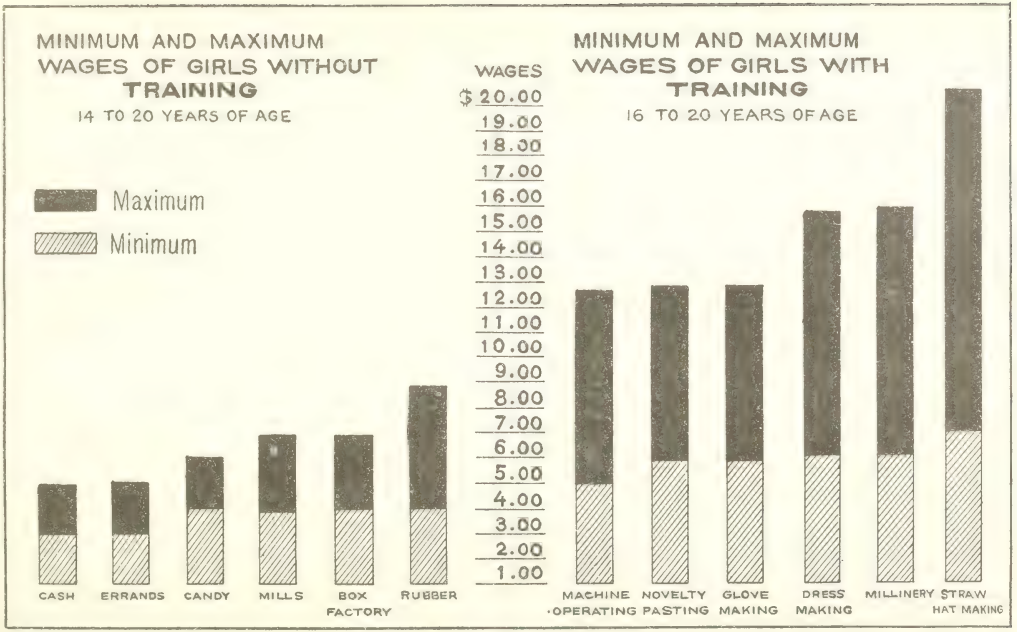

FIG. 8.

Wages of trained and untrained girls. The figures are from "The Public and the Girl Wage Earner, by Florence Marshal, in *Charities and the Commons*, Oct. 5, 1907.

grade increased the wages received by foreign-born girls, but that additional education in the ordinary schools slightly lowered the average earning capacity of these girls in factory work, though it enabled them to reach their maximum salary sooner. This study also showed that the foreign-born girls possessed greater earning power in factory work than the American girls. This apparent reversal of what would be expected is probably due to the low grade of work done by the girls in the factories. For such monotonous routine at machines it is probable that the brighter mind and broadened interests produced by education are a disadvantage. Furthermore, the girls who go into factory work after having many years of schooling are probably below the average in native ability. Miss Hodges says: "High school preparation turns the attention of most girls to lines of work other than those found in the factory. Those who drift into the factory have perhaps been failures elsewhere."[1]

Education and salaries in New York City.—A committee of the Brooklyn Teachers' Association[2] investigated the salaries received by graduates of the elementary schools and by others who stopped school before graduation. Of 192 boys from the elementary schools taken at random, the committee was able to trace 166 till they were about 30 years of age. At that time the average income of these 166 boys was $1,253.05, whereas the average salary of the illiterate worker in Brooklyn was $500 per year. If the parents of these 166 boys had bought each of them an annuity equal to the extra $753 per year, which his education enabled him to earn, it would have cost over $15,000 per boy. As the salaries of these boys will rise considerably after they are 30, while those of the illiterate laborers will not, it is obvious that this elementary education was worth more than a $15,000 capital safely invested for each boy.

Of 1,600 pupils in the night schools this committee found that wages were being received by them as follows:

Wages received by 1,600 pupils in New York City night schools

Grade on leaving school	Average age of pupils when [illegible]	Average age of pupils [illegible]	Average weekly wage	Average time [illegible] studied.
Below 5B	13.4	18.8	$ [illegible]	5.4
Below 8A	14.1	19.4	[illegible]	5.6
Entrance high school	15.0	17.0	[illegible]	2.0
Second year high school	15.9	18.8	[illegible]	2.8
Third year High School	16.9	19.9	[illegible]	3.0

From the above table it is seen that the pupils who remained through the high school were already, at the end of two years, receiv-

[1] Wage Worth of School Training, by Anna Hodges, p. 146.

[2] Report of the committee on incentives, in the report of the president of the Brooklyn Teachers' Association, 1909.

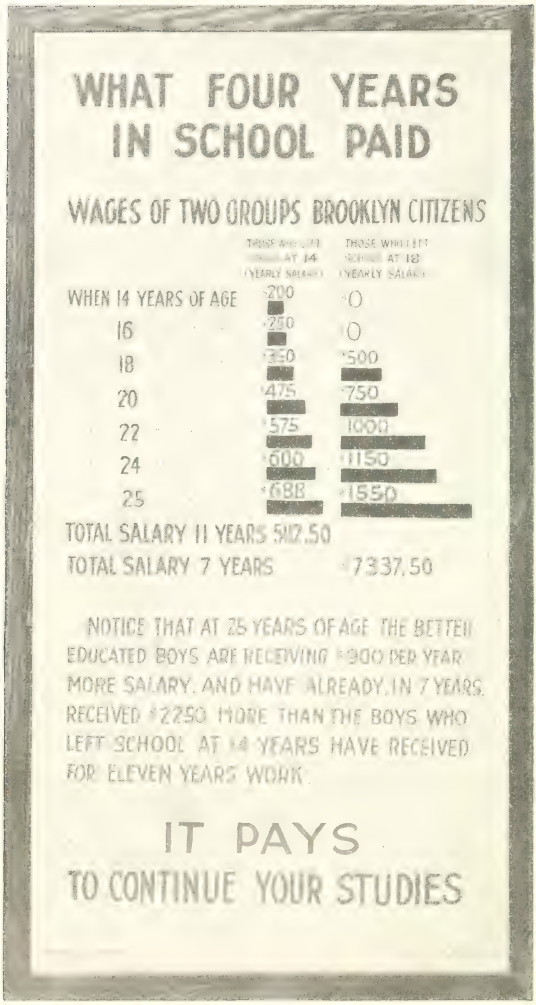
WHAT FOUR YEARS IN SCHOOL PAID
WAGES OF TWO GROUPS BROOKLYN CITIZENS
THOSE WHO LEFT SCHOOL AT 14 (YEARLY SALARY)
THOSE WHO LEFT SCHOOL AT 18 (YEARLY SALARY)
WHEN 14 YEARS OF AGE $200 $0
16 $250 $0
18 $350 $500
20 $475 $750
22 $575 $1000
24 $600 $1150
25 $688 $1550
TOTAL SALARY 11 YEARS $12.50
TOTAL SALARY 7 YEARS $7337.50
NOTICE THAT AT 25 YEARS OF AGE THE BETTER EDUCATED BOYS ARE RECEIVING $900 PER YEAR MORE SALARY, AND HAVE ALREADY, IN 7 YEARS, RECEIVED $2250 MORE THAN THE BOYS WHO LEFT SCHOOL AT 14 YEARS HAVE RECEIVED FOR ELEVEN YEARS WORK
IT PAYS
TO CONTINUE YOUR STUDIES

FIG. 9.

The figures represent the average of actual salaries received by two groups of children that left school at 14 and 18 years of age, respectively, and were investigated by the *Committee on Incentives* of the Brooklyn Teachers' Association.

ing more salary than those who quit at the eighth grade were receiving after more than five years' work. This is especially significant, as these pupils who left at the eighth grade showed that they were pupils of more than average energy and ambition, in that they, five years after leaving school, were still attending night school trying to improve themselves. Their comparatively slow rise in salary is therefore not to be accounted for by laziness or stupidity, though this may with justice be used to account for some part of the inability to succeed usually shown by the illiterate as compared with school graduates.

This same committee compared the earnings of the children who left school at 14 years of age with those of the children who remained until they were 18 years old. The average weekly earnings were as follows:

Comparison of wages of children who left New York City schools at 14 years of age with those who left at 18 years of age.

	Left school at 14.	Left school at 18.
Weekly salary when—		
14 years of age	$4.00	0
15 years of age	4.50	0
16 years of age	5.00	0
17 years of age	6.00	0
18 years of age	7.00	10.00
19 years of age	8.50	10.75
20 years of age	9.50	15.00
21 years of age	9.50	16.00
22 years of age	11.75	20.00
23 years of age	11.75	21.00
24 years of age	12.00	28.00
25 years of age	12.75	31.00
Total salary to 25 years of age	$5,112.50	$7,337.50

It is seen that already, at 25 years of age, the boy who had remained in school till he was 18 had received about $2,000 more salary than the boy who left at 14, and was then receiving over $900 per year more. From this time on the salary of the better educated boy will rise still more rapidly. However, reckoning the average difference in salary at only $900 per year, this equals an annuity that would cost $19,000 if bought from a reliable insurance company—not a bad return for four years of youth devoted to the school.

The committee of Brooklyn teachers also looked into the schedule of salaries paid for various kinds of work which demanded different grades of education. In 2,394 bakery establishments employing 12,000 males over 18 years of age, but requiring only the most elementary education, the average salary paid was $657 per year, whereas in the city departments demanding education equal to that given by a commercial high school the average salary of 1,579 employees was $1,597. In the bridge department of New York City the average pay of 139 men, with an average service of nine years,

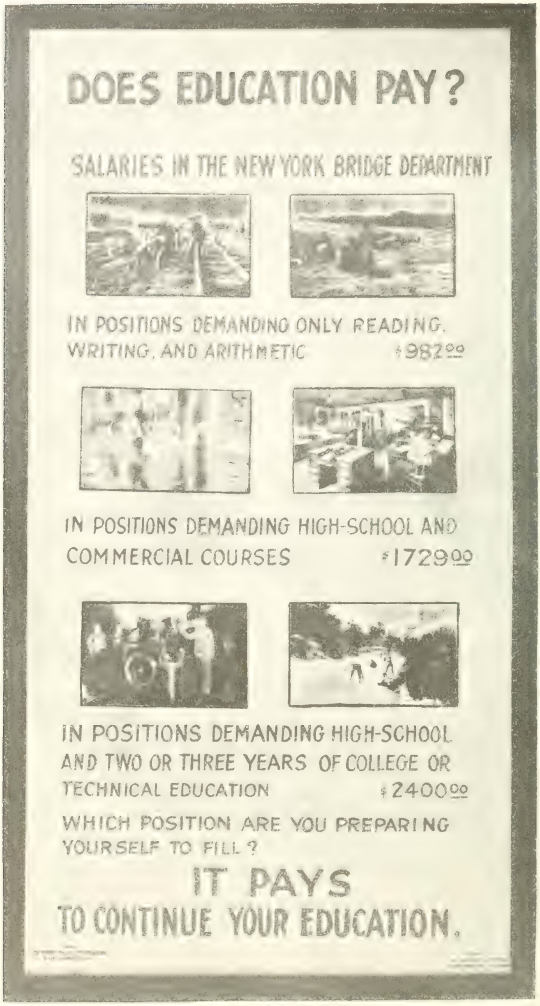
DOES EDUCATION PAY?
SALARIES IN THE NEW YORK BRIDGE DEPARTMENT
IN POSITIONS DEMANDING ONLY READING, WRITING, AND ARITHMETIC $982.00
IN POSITIONS DEMANDING HIGH-SCHOOL AND COMMERCIAL COURSES $1729.00
IN POSITIONS DEMANDING HIGH-SCHOOL AND TWO OR THREE YEARS OF COLLEGE OR TECHNICAL EDUCATION $2400.00
WHICH POSITION ARE YOU PREPARING YOURSELF TO FILL?
IT PAYS
TO CONTINUE YOUR EDUCATION.

FIG. 10.

The figures are from the "Report of the Committee on Incentives" in the *Report of the Brooklyn Teachers' Association for 1909.*

in work demanding no education beyond reading and writing and a little arithmetic, was $982 per year. In the clerical positions demanding the equal of a commercial high-school education the average salary of 31 persons with an average service of 13 years was $1,720 per year. In the engineering department, where high-school graduation and three or four years of college or technical school education were demanded, the average salary of 134 persons with an average service of 7 years was $2,400 per year.

Springfield high-school graduates' salaries.—In 1908 a study was made of the graduates of the commercial department of the Springfield (Mass.) High School from the first class of 1900 to that of 1907. Of the 76 graduates, 67 were followed up completely. The salaries of these graduates are shown in the table below. From this table it is seen that these graduates went out into business at an average salary of about $400, but rose rapidly at an average increase of about $116 per year, those who were out as long as seven years averaging at that time more than $1,000 each year. These salaries will, of course, continue to rise for several years yet.

Salaries of graduates commercial department Springfield (Mass.) High School.[1]

Class.	Average salary first year.	Average salary 1908.	Average yearly increase in salary.	Years since graduation.
1901	$396.70	$1,100.00	$87.33	7.3
1902	420.40	1,064.40	87.20	6.3
1903	421.20	1,060.80	117.93	5.3
1904	468.66	894.66	116.15	4.3
1905	574.11	1,001.00	122.00	3.5
1906	581.25	1,045.00	87.20	2.5
1907	681.75	817.50	134.75	1.5
1907	692.04	831.00	139.12	1.3
Average or total			116.52	

[1] H. L. Collins, Commercial Education in Business Schools, Bull. No. 7, 1910, Bureau of Education.

Every day at school worth nine dollars.—The Springfield and Brooklyn studies represent a fair average of what may be expected as a result of a good school system. The increase above $1,000 in salary of later years will more than compensate for the first few years in which the salary is below this figure. The life expectancy of the average high-school boy is more than 40 years. If we take this average annual salary of $1,000 for a period of 40 years and compare it with the illiterate laborer's salary of $500 per year for the same length of time, we can see how richly the child and the community are repaid for each day the child attends school.

$1,000 for 40 years equals	$40,000
$500 for 40 years equals	20,000
Difference	20,000

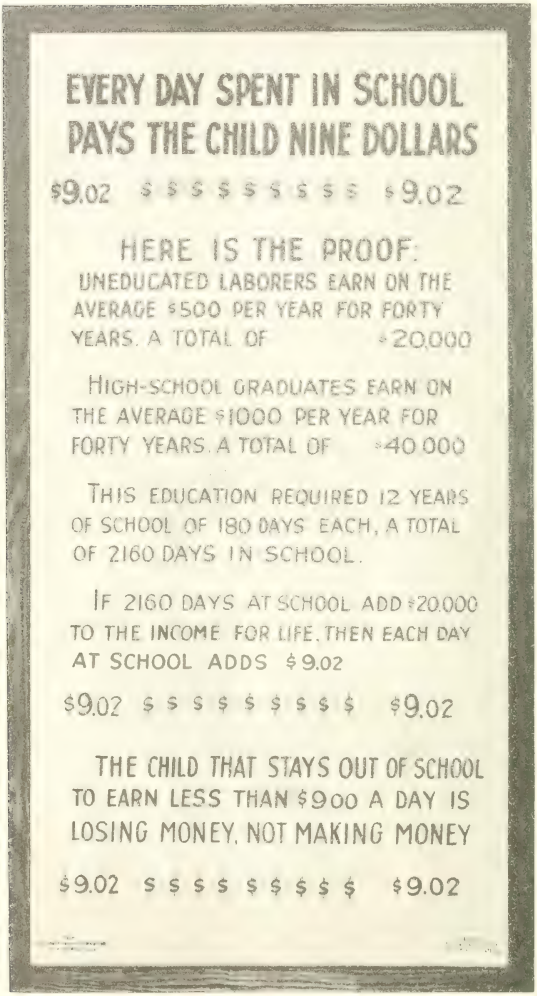
EVERY DAY SPENT IN SCHOOL
PAYS THE CHILD NINE DOLLARS
$9.02 $ $ $ $ $ $ $ $ $ $9.02
HERE IS THE PROOF:
UNEDUCATED LABORERS EARN ON THE AVERAGE $500 PER YEAR FOR FORTY YEARS. A TOTAL OF $20,000
HIGH-SCHOOL GRADUATES EARN ON THE AVERAGE $1000 PER YEAR FOR FORTY YEARS. A TOTAL OF $40,000
THIS EDUCATION REQUIRED 12 YEARS OF SCHOOL OF 180 DAYS EACH, A TOTAL OF 2160 DAYS IN SCHOOL.
IF 2160 DAYS AT SCHOOL ADD $20,000 TO THE INCOME FOR LIFE, THEN EACH DAY AT SCHOOL ADDS $9.02
$9.02 $ $ $ $ $ $ $ $ $ $9.02
THE CHILD THAT STAYS OUT OF SCHOOL TO EARN LESS THAN $900 A DAY IS LOSING MONEY, NOT MAKING MONEY
$9.02 $ $ $ $ $ $ $ $ $ $9.02

FIG. 11.

Twelve years of 180 days each, or a total of 2,160 days of school, bring the child, therefore, an added life income of $20,000, or a return of between nine and ten dollars for each day spent in school.

Education and earning power in Wisconsin.—Mr. O. B. Staples made a study of the amount of schooling and of the incomes of 500 adults, representing 75 per cent of the population of Lake Geneva, Wis.[1] Of those who had had less than five years of schooling only 22 per cent had an income of over $700 per year, while of those who had had as much as nine years of schooling over 77 per cent were making over $700 per year. This was in spite of the fact that many of those who had attended school for nine years or more were women, who for the same work are paid lower salaries than men, and young high-school graduates who had not been long out of school and hence were just getting a start.

Earning power of Minneapolis school children.—Supt. B. B. Jackson, of Minneapolis, studied the earnings of 3,315 pupils who left school at the end of the eighth grade and found that they started life with an average salary of only $240 per year. A similar study made by him of the salaries of 912 graduates of the high school showed that they started out with an average salary of $600 and after six years were earning an average of $1,380.[2]

Education and farm income in New York.—Warren and Livermore, of Cornell, made a study of 1,303 farmers in four townships of Tompkins County, N. Y. They found that no college graduate had been reduced to the position of a renter, and that only 17 per cent of the renters had more than the district-school education. The average labor income was as follows:

	Per year.
Of 1,007 with district-school education	$318
Of 280 with high-school education	622
Of 16 with college education	847

Of those with high-school education, 20 per cent were making over $1,000 per year, while only 5 per cent of those with district-school education were making that much.[3]

Education and farm income in Indiana.—"A Farm Management Survey of Three Representative Areas in Indiana, Illinois, and Iowa"[4] showed that 273 land owners operating farms possessed education and secured labor incomes as follows:

[1] Elementary School Teacher, 10: 261-269. Feb., 1910. "Is There a Relation between the Amount of Schooling and Financial Success in Later Life?" by O. B. Staples.

[2] Quoted in School Education, Nov., 1914, p. 5.

[3] "Education of Farmers," in Ag Agricultural Survey, Cornell University Bulletin 276.

[4] Bul. No. 41, U. S. Dept. of Agr.; quoted in Rural Manhood, Sept., 1914, pp. 201-205.

Education and labor income of land owners.

Education.	Number studied.	Average size (acres) of farm.	Average capital.	Average labor income.	Average age.
None at school	4	91	$15,039	$586	55
Common school	214	165	27,494	301	51
High school	46	206	37,725	651	46
College, etc	9	240	48,781	796	53

This table fails to indicate any decided superiority in annual producing power on the part of those landowners with the higher education. The college graduates are $495 a year ahead of the common-school graduates, but on the other hand they have a capital of $42,781 each as against $27,494 for the common-school graduates. The small superiority in income might be due to the superiority in capital. Furthermore, the four totally unschooled men made more on the average than the average made by those with common-school education. Here again the results are not dependable, since four is too small a number to use in getting an average; one exceptional man would put the average far out of place. Then, too, many farm owners put their earnings in improvements to the soil and in upbuilding the farm, so that the real annual production is not shown by the cash labor income.

In the case of renters this large factor of error would be much reduced and the renter's cash labor income would more nearly represent his actual producing power. In this same survey 247 farm tenants also were studied, with the results shown in the following table:

Education and labor income of land renters.

Education.	Number studied.	Average size (acres) of farm.	Average capital.	Average labor income.	Average age.
None at school	4	118	$1,650	$680	49
Common school	186	167	2,200	742	38
High school	51	190	3,203	1,268	33
College, etc	6	294	3,351	1,721	41

In this case the superior labor incomes of those with better education are very noticeable, and especially so the superiority of the much younger high-school graduates over the unschooled and over the common-school graduates. While the high-school graduates have a larger average capital and work larger farms, this difference is hardly enough to account for the superior earning power shown by the high-school graduate in farming. The number of college graduates and of illiterates is too few to serve as a basis for any safe conclusions.

Education helps Missouri farmers.—In 1912 the Missouri College of Agriculture conducted a survey of 656 farms in Johnson County,

Mo. Of these farms, 554 had only a district-school education, while 102 had received more than that. It was found that the better educated farmers operated 33 per cent more land and owned four-fifths of the land they operated, as against three-fifths owned by those with only district-school education; they kept one-sixth more stock, worked 14 per cent more land per workman, and earned 71 per cent more clear labor income per year. Prof. O. R. Johnson, in concluding his report of this survey, says:

> While other factors may have played some part in his greater earning capacity, yet from a careful study of the organization of his business it appears that education must have played a very large part in his greater earning ability.

Salaries earned by pupils of Beverly (Mass.) Trade School.—The results of the strictly technical or trade school education have been just as unmistakable as have been those of the schools of general culture. The "Fourth Annual Report of the Trustees of the Beverly Industrial School, 1912," gives the earnings from year to year, as they passed through the school, of the 12 graduates who had spent two and a half years in the school. This school requires as part of its course of study actual piecework in the mills under all the requirements and conditions of ordinary factory work, except the additional instruction given by teachers and the part time devoted to school work. Summing up these results, the secretary says:

> The wage-earning capacity of these boys when they entered school is conservatively estimated at $6 per week * * *. The wage-earning capacity of these boys at the time of graduation ranged from $15 to $18 per week. In 120 weeks of shopwork under school directions the boys increased their average earning power in competition with other workmen and under actual factory conditions by more than 250 per cent and were, in fact, earning at the close of the period wages at the rate of $800 per year.

These final salaries are not estimates, but are actual amounts earned by these boys in the factory working on full time at the end of the school course. That the practical machinists appreciate the value of this school work is shown by the fact that while only 5 machinists and metal workers in 1910–11 sent their sons, 22 sent them in 1911–12, of whom 20 were from one of the big factories in which the school boys had been given part of their practice work.

The Baron de Hirsch Trade School.—This school takes in young men who are already at work and gives them 5½ months of trade education. These young men are usually those who have gone out of the public schools early and found themselves making unsatisfactory progress in industry. The wages of 839 of the graduates of this school were studied and gave the following interesting results:[1] These graduates had entered the school at an average of 17½ years of

[1] Taken from the report of the national commission on vocational education, by W. A. O'Leary in his "Report on the Wage Value of Vocational Training," pp. 1457–60.

age, when they were receiving an average of $6 per week, with poor prospects of increase. Immediately on graduation they earned on the average $7.28 per week and within two years were earning $12 per week, with prospects of more or less steady further increase for 10 or 20 years. One hundred and fifty-eight machinists that entered at an average salary of $6.66 went back to work after five and a half months of schooling at an average of $8.96 per week; 66 carpenters that entered at $6.14 went out at $9.01 per week; and 270 electricians that entered at $5.76 went out at $7.12 per week. Of more value than the 24 to 47 per cent increase in wages resulting from the six months' school training was the great prospect for continued future advance for many years, as opposed to the early maximum salary reached by the untrained.

Graduates of the Milwaukee School of Trades.—The wages received by 25 graduates of the Milwaukee School of Trades who went into the pattern-making industry were investigated and compared with the wages of others who entered this field through apprenticeship. During their four years of apprenticeship the apprentices each received a total of $1,433.75. During the first two years after leaving the trade school those entering this industry from the trade school received on the average a total of $1,635.92. It thus appears that before he is 20 years of age the trade-school graduate had received in two years a larger total salary than the apprentice had in four years and was already well ahead of him in the wage scale. The president of the school writes: "I am convinced that if we follow up the experiences of the graduates of the other three trades, we would find even greater advantage gained."[1]

Graduates of the New York Vocational School for Boys.—The New York Vocational School for Boys gives only two years' preparatory trade training to 14-year-old boys, or younger boys who have completed the grammar school. The records of the salaries of all the first graduates of this school after six months of employment, as compared with nongraduates working in the same lines, were as follows:

Wages of vocational graduates and nongraduates compared.

Trade.[2]	Average wage of graduate.	Average wage of non-graduate.
Architectural and mechanical drawing	$9.50–$11.50	$6.50
Carpentry	6.00– 11.25	4.74
Machine shop	7.50– 13.13	$4.73– 6.18
Electric wiring	8.40– 12.94	5.90– 7.25

[1] Report on the Wage Value of Vocational Training, by W. A. O'Leary, pp. 1426–27.

[2] Quoted from the report of the principal of the New York Vocational School for Boys for 1911–12, by W. A. O'Leary in his "Report on the Wage Value of Vocational Training," p. 1430.

Graduates of the Rochester Shop School.—The records of 36 graduates of the Rochester Shop School were compared with those of 696 other boys in the same city who left the grammar school at 14 to 16 years of age. The boys are admitted to this shop school at 14 years of age. The 36 spent on the average 14.9 months in the school. The average wage of these shop-trained boys on leaving the school was $7.50 per week, which rose to $9.06 by the end of 12.5 months. The untrained boys, on the other hand, averaged only $4.89 per week during the year and had changed jobs on the average every 17 weeks, whereas the trained boys held their jobs on the average for 12.5 months. Over 95 per cent of the untrained boys were still in the unskilled occupations with no outlet or hope of promotion, whereas 94 per cent of the trained boys were in skilled industries with good prospects of promotion.[1]

Earnings of graduates of Lowell Textile School.—The authorities of the Textile School of Lowell, Mass., are quoted in the American School Board Journal[2] as follows:

> Results of a recent canvass of the alumni lead to the belief that nearly 60 per cent of the graduates from the day classes are receiving a salary of over $1,000 a year; 20 per cent are receiving $2,000 a year and over, with some cases of $4,000, $5,000, and $7,000 salaries. The first graduate has not yet been out from the school 10 years.

Earning power of graduates of Newark Evening Technical School.—The New Jersey commission on industrial education in 1908 made a careful study of the salaries of the graduates of the Newark Technical School, which had been in existence long enough (since 1881) to show clearly what was the effect of its training. Definite information as to salaries received was secured from 85 per cent of these graduates. The condition of the other 15 per cent was looked into by the commission enough to convince them that the results secured from the 85 per cent would apply equally well to those from whom they did not get definite replies to their questions. These students carried on remunerative work at the same time that they were studying in this school. The average graduate was found to have begun his work at 14 years of age at a salary of $3.55 per week, and to have risen rapidly until at 37 years of age the average salary was $42.03 per week. Those in the machine trades had begun at $3.76 per week and had gone to $57.17 per week by the time they were 37 years old.

The United States census at that time showed the average salaries paid in the country to be approximately as follows:

Unskilled machine industries	$8
Unskilled building trades	12
Skilled machine trades	18
Skilled building trades	23

[1] Taken from the report of the board of education of the city of Rochester for 1913, by W. A. O'Leary in his "Report on the Wage Value of Vocational Training," pp. 1430–31.
[2] May, 1909, p. 25.

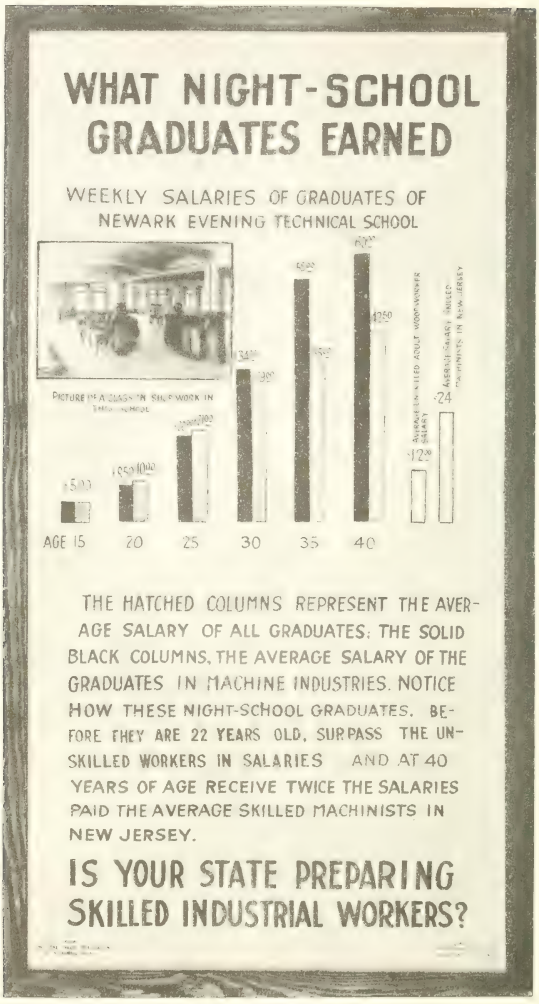
WHAT NIGHT-SCHOOL GRADUATES EARNED
WEEKLY SALARIES OF GRADUATES OF NEWARK EVENING TECHNICAL SCHOOL
PICTURE IN A CLASS IN SHOP WORK IN EVENING SCHOOL
$5.03
$10.00
$18.00
$34.00
$30
$42.50
$24
$12.00
AGE 15
20
25
30
35
40
AVERAGE UNSKILLED ADULT WORKINGMEN'S SALARY
AVERAGE SALARY SKILLED MACHINISTS IN NEW JERSEY
THE HATCHED COLUMNS REPRESENT THE AVERAGE SALARY OF ALL GRADUATES: THE SOLID BLACK COLUMNS, THE AVERAGE SALARY OF THE GRADUATES IN MACHINE INDUSTRIES. NOTICE HOW THESE NIGHT-SCHOOL GRADUATES, BEFORE THEY ARE 22 YEARS OLD, SURPASS THE UNSKILLED WORKERS IN SALARIES AND AT 40 YEARS OF AGE RECEIVE TWICE THE SALARIES PAID THE AVERAGE SKILLED MACHINISTS IN NEW JERSEY.
IS YOUR STATE PREPARING SKILLED INDUSTRIAL WORKERS?

FIG. 12.

The figures are from the *Report of the New Jersey Commission on Industrial Education.* This school was established in 1884. The salaries of 85 per cent of the graduates were secured. Others not secured were thought to be equally good. This is a night school, the students earning salaries in regular work during the day.

Those boys, then, by taking the training offered in that school had made themselves over seven times as valuable as average unskilled machinists and over three times as valuable as average skilled machinists.

Further recognition of the value of education in increasing efficiency is seen in the establishment by the railroads and by numerous large business enterprises at their own expense of special courses, night schools, and day schools for their employees. They have found it impossible to secure from our present inadequately equipped school system the supply of well-educated workers that they need.

Value of education in a railroad shop.—In answer to a question as to what, if any, increase in the value of their workmen had been brought about by a quite complete system of shop trade schools which had been introduced, the representative of a large railroad corporation replied:

> We have ascertained that the efficiency of apprentices has increased 25 per cent; that is, on account of our system of instruction they are able to accomplish that much more work than they could before we adopted our present apprentice system. We are, through the medium of our skilled shop instructors, able to use the apprentices on all classes of work, while formerly they were engaged in the simpler classes of work as well as on the simpler machines. Under our present system, however, we are able to use apprentices on any machine, even the most complicated. While we can not measure this in percentage or even dollars and cents, it is a matter of great convenience; especially is it so when a regular man operating some difficult and complicated machine lays off a few days, and it is not economical to put another man in his place on account of not being familiar with the work of the machine; in lieu of which we place an apprentice on the machine and with the help of the instructor he is able to give a fair day's output. In this alone we can save fully 25 per cent.
>
> We have found also that our graduated apprentices' earning capacity has increased 18 per cent over and above those who did not have the advantage of our apprentice instruction. This fact is particularly emphasized by our shop foremen, who greatly prefer having one of our apprentice graduates than to have a mechanic who has served an apprenticeship on other roads and who has not enjoyed the benefits of our present apprentice system.
>
> While all these percentages are not accumulative, you can safely bank on about 25 per cent increase in efficiency in the boys, due to our method of training and educating them.
>
> Another great advantage I should mention is that when our apprentices are graduates they are capable of operating any machine or doing any class of work in the department in which they have served their apprenticeship. While this can not always be measured in dollars and cents, it is of immense benefit and value to the officers in charge of the shop, as they always have young mechanics in the shop who can perform any class of work which may arise, and one man's leaving the service will not tie up a single machine nor cripple the service.[1]

In considering the value of these several studies it could be said that Mr. Dodge was an exceptional employer, and that the work of

[1] Quoted by W. S. O'Leary in his Wage Value of Vocational Training, pp. 1431–32.

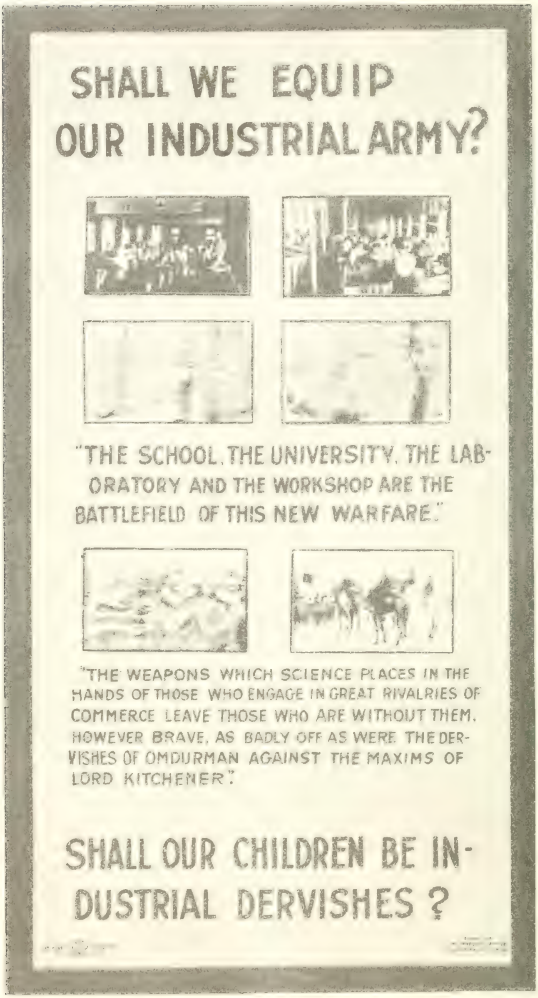
SHALL WE EQUIP
OUR INDUSTRIAL ARMY?
"THE SCHOOL, THE UNIVERSITY, THE LABORATORY AND THE WORKSHOP ARE THE BATTLEFIELD OF THIS NEW WARFARE."
"THE WEAPONS WHICH SCIENCE PLACES IN THE HANDS OF THOSE WHO ENGAGE IN GREAT RIVALRIES OF COMMERCE LEAVE THOSE WHO ARE WITHOUT THEM, HOWEVER BRAVE, AS BADLY OFF AS WERE THE DERVISHES OF OMDURMAN AGAINST THE MAXIMS OF LORD KITCHENER."
SHALL OUR CHILDREN BE INDUSTRIAL DERVISHES ?

FIG. 13.

The first quotation is from Sir Norman Lockyear's "Brain Power in History." The second is cited by Sir Norman from a speech by Mr. Haldane.

the General Electric Co. represents an unusual type of work that especially demands education; that the Massachusetts commission did not study enough cases; that the studies of the Brooklyn teachers did not include always a large enough per cent of the pupils of the school, and so on for the rest of the numerous studies. Any one of these studies may not be conclusive, but when all of them point so clearly and without exception to the greatly superior earning power of the educated, the conclusion is irresistible.

SALARIES OF COLLEGE GRADUATES.

Earnings of Princeton graduates.—In the "Decennial Record of the Class of 1901, Princeton University," a report is given of the salaries received by the members of this class during the first 10 years after graduation. The number from whom reports were secured each year varied slightly, but on the first year 111 reported an average salary of $706, which by the fifth year increased to $2,039.42, and by the tenth year, with 149 reporting, reached $3,804. This high average is in spite of 19 teachers and clergymen in the class, whose average salary in the tenth year was between $1,700 and $1,800—about half what the classmates in other professions and in business were receiving. The Princeton class of 1906 likewise started out with an average salary reported of $859.69, which at the end of five years had risen to $2,225.80, showing practically the same rate of increase as was seen in the class of 1901.[1]

Earnings of Yale graduates.—A study has also been made of the salaries received for the first five years by those who went out in 1906, both graduates and nongraduates, from the Sheffield Scientific School of Yale.[2] Reports were secured from 188, or about two-thirds of the class, showing that the average salaries received were as follows:

First year	$683.85
Second year	898.39
Third year	1,257.24
Fourth year	1,686.14
Fifth year	2,040.04

Earnings of a Harvard law-school class.—A similar study of the Harvard law class graduating in 1905 showed that two years after graduating, with 163 reporting, they were receiving an average salary of $1,188, and that five years after graduation, with 134 reporting, the average had climbed to $2,616.[3]

[1] The Decennial Record of the Class of 1901, Princeton University, pp. 344–345, and the Fifth Record of the Class of 1906, Princeton University, pp. 249–250.
[2] Yale Alumni Weekly, 23: 6, Sept. 30, 1913.
[3] Yale Alumni Weekly, 23: 244–45, June 13, 1913.

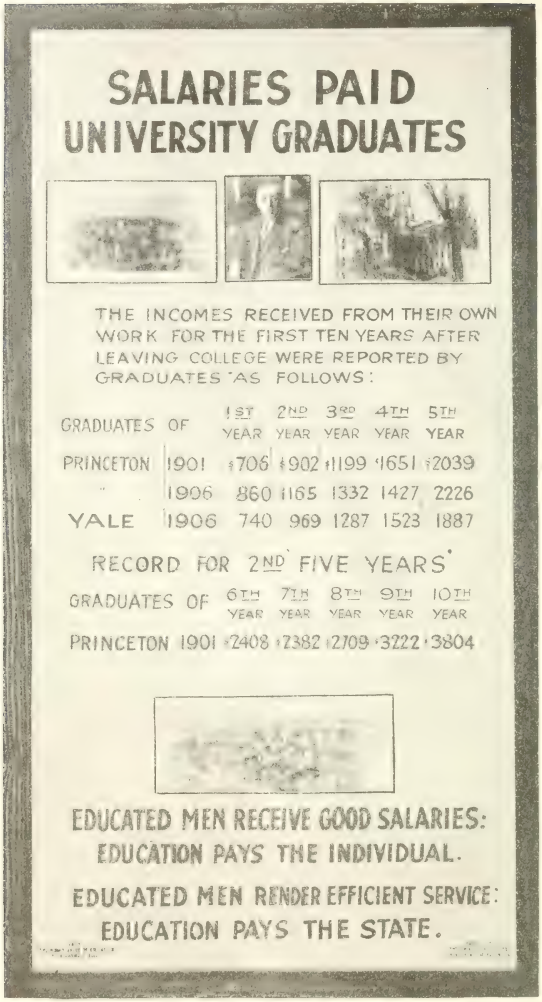
SALARIES PAID
UNIVERSITY GRADUATES
THE INCOMES RECEIVED FROM THEIR OWN WORK FOR THE FIRST TEN YEARS AFTER LEAVING COLLEGE WERE REPORTED BY GRADUATES AS FOLLOWS:
GRADUATES OF | 1ST YEAR | 2ND YEAR | 3RD YEAR | 4TH YEAR | 5TH YEAR
PRINCETON 1901 $706 $902 $1199 $1651 $2039
" 1906 860 1165 1332 1427 2226
YALE 1906 740 969 1287 1523 1887
RECORD FOR 2ND FIVE YEARS
GRADUATES OF | 6TH YEAR | 7TH YEAR | 8TH YEAR | 9TH YEAR | 10TH YEAR
PRINCETON 1901 $2408 $2382 $2709 $3222 $3804
EDUCATED MEN RECEIVE GOOD SALARIES:
EDUCATION PAYS THE INDIVIDUAL.
EDUCATED MEN RENDER EFFICIENT SERVICE:
EDUCATION PAYS THE STATE.

FIG. 14.

The figures are from "The Fifth-Year Record of the Class of 1906, Princeton University," pages 245–259. Reports were from about two-thirds of the members of the classes. In the same way 10 years after graduation the class of 1899 of Dartmouth reports an average income of $2,097; the class of 1903 of Northwestern University an average of $1,863 for the fifth to tenth year after graduation; and the Harvard law class of 1905 reports an average of $2,616 the fifth year after graduating in law.

Earnings of Northwestern graduates.—Northwestern University made an investigation of the salaries received by its graduates of 1903[1] and found that during the first five years these averaged $867 and for the next five years $1,862 per year. While this seems lower than the salaries reported from the eastern universities, it must be remembered that the average salary for the last five years and not the average salary of the tenth year is given. It should also be remembered that 10 years after his graduation the average college man is only a little over 30 years old, and has a prospect of continued increase in salary for another 10 or 20 years.

Earnings of Dartmouth graduates.—In 1909 reports were secured from 67 out of 100 of the class of 1899 of Dartmouth College, which showed that the average salary received by these men 10 years after graduation was $2,097.25.[2]

Salaries of University of Texas graduates.—In reply to a questionnaire sent out by Mr. E. V. White concerning the earnings of the 192 graduates of his class (1903) of the University of Texas, 76 reported. In these reports personal earnings (wages, salaries, and professional fees) were reported separate from income from inherited property or speculation. Fifty-four of the students reporting had earned part or all of the money expended on their education, and hence represented not even well-to-do families. Average annual salaries reported by these graduates were as follows:

Salaries of graduates of the University of Texas.

		First year	Third year	Fifth year	Eighth year	Tenth year.
Academic	Men...	$666	$1,251	$2,111	$2,462	$2,522
	Women...	509	697	842	1,011	1,015
	Average...	620	1,052	1,605	1,985	2,108
Engineering...		698	1,378	1,915	3,067	3,812
Engineering...		857	1,091	1,240	1,805	2,005
Law...		1,092	1,642	2,750	3,000	3,667
Pharmacy...		625	1,076	1,250	1,575	1,850
Average...		708	1,310	1,822	2,448	2,948

In reply to the objection that these do not represent fair averages of the graduates' wages, because only those who have good salaries would answer such a questionnaire, Mr. White writes that he is personally acquainted with many of those not reporting and knows that many of them have even better salaries than the averages given above.[3]

Increased earning power of evening students in Pennsylvania School of Finance and Accounts.—The rate of increase in salaries from year to year of the students who have attended the night School of Finance and Accounts of the University of Pennsylvania while

[1] The Dial, 55, No. 649, p. 10, July 1, 1913.
[2] H. A. Miller, Science, N. S. 31, 789-790, May 6, 1910.
[3] The above is taken from a manuscript report presented by E. V. White, now dean of the Texas College of Industrial Arts.

continuing their regular business occupations during the day presents another remarkable instance of the immediate financial returns from education. Three hundred and fifty men graduated from this evening school in seven years, beginning in 1907. The average salaries of these students on entering the school, the salaries in 1913, the percentage of annual increase, and the total increase were as follows:[1]

Salaries of students before entering and after leaving the University of Pennsylvania Evening School of Finance and Accounts.

Year of enrollment.	Year of graduation.	Average salary on enrollment.	Average salary, 1913.	Per cent increase.	Per cent increase per annum.
1904....	1907	$1,040	$3,120	198	22
1905....	1908	956	3,347	250	31
1906....	1909	1,003	2,700	179	26
1907....	1910	1,044	1,869	79	13
1908....	1911	940	1,690	79	16
1909....	1912	807	1,411	75	19
1910....	1913	753	1,480	96	32

Average annual increase, 23 per cent.

It will be seen that those students who entered in 1904, having an average salary of $1,040, have increased it on the average 22 per cent each year, and nine years later have an average salary of $3,120. Those who entered in 1905 with an average salary of $956 progressed even more rapidly, making gain in salary of 31 per cent a year and reaching in eight years an average of $3,347 per year. The record for all classes taken together shows an average increase in salary of the entire body of graduates of 23 per cent a year. Business men are not in the habit of increasing the salaries of their employees 23 per cent a year, or giving to them average salaries of over $3,000. If these students are promoted at that rate and receiving such salaries, then their training in school must have given them an increased efficiency somewhat in proportion to their increased salaries.

Superior earning power of graduates of schools is a demonstrated fact.—Such studies as the above, while open to the criticisms that have been mentioned before, because of the fact that the educated are a selected set to begin with, have nevertheless answered unmistakably the question as to whether the schools, with all their admitted imperfections, are preparing their pupils for greater economic efficiency. The figures show conclusively that the schools are giving their pupils a greater earning power than even the strongest advocates of education had claimed. Inevitably, as the economic processes become more complex, the relative need for directive force in industry becomes greater and greater. Experience has shown that only through a thorough system of public schools and colleges can a State or nation provide for itself an adequate supply of citizens capable of furnishing this necessary directive force.

[1] Old Penn Weekly Review, 1913, p. 202.

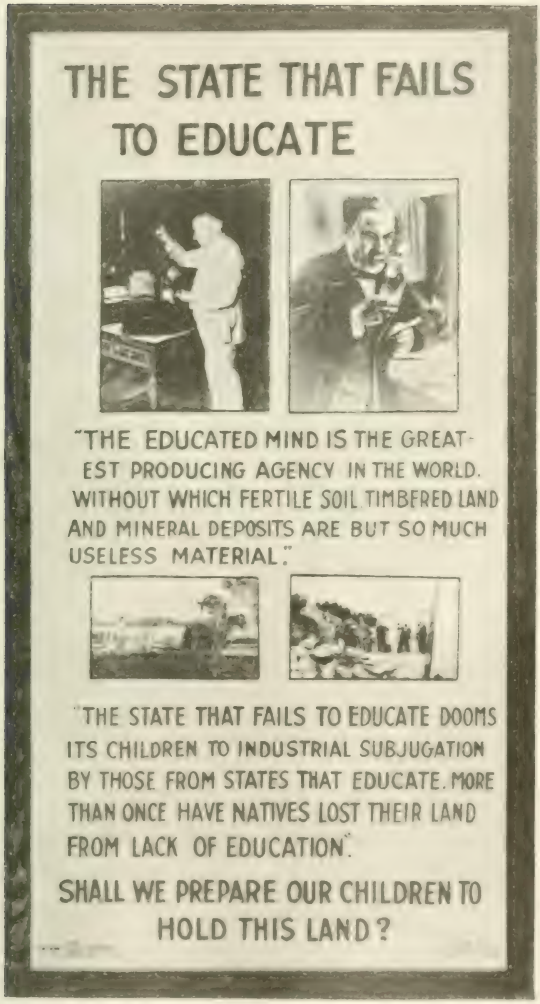
THE STATE THAT FAILS TO EDUCATE
"THE EDUCATED MIND IS THE GREATEST PRODUCING AGENCY IN THE WORLD. WITHOUT WHICH FERTILE SOIL TIMBERED LAND AND MINERAL DEPOSITS ARE BUT SO MUCH USELESS MATERIAL."
"THE STATE THAT FAILS TO EDUCATE DOOMS ITS CHILDREN TO INDUSTRIAL SUBJUGATION BY THOSE FROM STATES THAT EDUCATE. MORE THAN ONCE HAVE NATIVES LOST THEIR LAND FROM LACK OF EDUCATION."
SHALL WE PREPARE OUR CHILDREN TO HOLD THIS LAND?

FIG. 15.

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